

Appl No.: 10/661,184

Atty. Dkt. No. UCF-370

Amendment to the Claims:RECEIVED
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This listing of the claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claim 1 (Currently amended). A method of optical regeneration comprising in combination the steps of:

exponentially amplifying a degraded input signal with a piece of fiber with parametric amplification; and

providing gain saturation to the exponentially amplified signal to form a regenerated output signal.

Claim 2 (Original). The method of claim 1, wherein the steps of exponentially amplifying and gain saturation are provided by two independent devices.

Claim 3 (Original). The method of claim 1, wherein the steps of exponentially amplifying and gain saturation are provided by a single device.

Claim 4 (Currently amended). The method of claim 1, wherein the exponential amplification is provided by one of a dispersion shifted fiber and a photonic crystal fiber with parametric amplification.

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Claim 5 (Original). The method of claim 1, wherein the gain saturation is provided by a semiconductor optical amplifier.

Claim 6 (Original). The method of claim 1, wherein the gain saturation is provided by self-phase modulation induced supercontinuum generation of the input data used as a pump.

Claim 7 (Currently amended). An apparatus for optical regeneration of degraded data, comprising:

- a parametric amplifier pumped by input data; and
- a continuous wave (CW) laser as the probe for the parametric amplifier;
- a saturation amplifier for receiving output from the parametric amplifier, wherein a regenerated output signal is generated, wherein the polarization of the CW laser is linear and aligned to have maximal overlap with polarization of the input data and the power of the CW laser is controlled so that the power of regenerated data is independent of the state of polarization of the input data.

Claim 8 (Original). The apparatus of claim 7, wherein the input signal is a non return-to-zero (NRZ).

Claim 9 (Original). The apparatus of claim 7, wherein the input signal is a return-to-zero (RZ).

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Claim 10 (Original). The apparatus of claim 7, wherein the polarization of the CW laser is aligned with polarization of the input data.

Claim 11 (Canceled).

Claim 12 (Original). The apparatus of claim 7, wherein the parametric amplifier is an optical fiber with its zero-dispersion wavelength optimized for parametric amplification, which should be approximately the same as that of the wavelength of the input signal and the saturation amplifier is a semiconductor optical amplifier.

Claim 13 (Original). The apparatus of claim 12, wherein the fiber is a photonic crystal fiber.

Claim 14 (Original) The apparatus of claim 12, wherein the parametric amplification medium is a third nonlinear optical crystals.

Claim 15 (Original). The apparatus of claim 12, wherein the parametric amplification medium is a second-order nonlinear optical crystals used cascading third-order nonlinear optical material.

Claim 16 (Currently amended). An apparatus for optical regeneration comprising:
a pulsed light source, wherein the polarization of the pulsed light source is linear;
an optical fiber parametric amplifier; and

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a saturation amplifier wherein input data is used as the pump for the optical fiber parametric amplifier and output of the parametric amplifier is input into the saturation amplifier.

Claim 17 (Original). The apparatus of claim 16, wherein the pulsed light source is generated from:

a clock signal recovered from the input data.

Claim 18 (Original). The apparatus of claim 16, wherein the input signal is a NRZ signal.

Claim 19 (Original). The apparatus of claim 16, wherein the input signal is a RZ signal.

Claim 20 (Original). The apparatus of claim 16, wherein the parametric amplifier is an optical fiber with its zero-dispersion wavelength optimized for parametric amplification, which should be approximately the same as that of the wavelength of the input signal and the saturation amplifier is a semiconductor optical amplifier.

Claim 21 (Original). The apparatus of claim 20, wherein the fiber is a photonic crystal fiber.

Claim 22 (Original). The apparatus of claim 21, wherein the parametric amplification medium is a third nonlinear optical crystals.

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Claim 23 (Original). The apparatus of claim 21, wherein the parametric amplification medium is a second-order nonlinear optical crystals used cascading third-order nonlinear optical material.

Claim 24 (Original). The apparatus of claim 20, wherein the polarization of the pulsed light source is aligned with polarization of the input data.

Claim 25 (Original). The apparatus of claim 20, wherein the polarization of the pulsed light source is linear and aligned to have maximal overlap with polarization of the input data, and the power of the pulsed laser is controlled so that the power regenerated data is independent of the state of polarization of the input data.

Claim 26 (Currently amended). An apparatus for optical regeneration comprising:
a CW laser; and
a fiber with parametric amplification as an exponential amplifier operating in a saturation state ~~a saturating parametric amplifier~~, wherein input data is used as a pump for the exponential amplifier ~~saturating parametric amplifier~~.

Claim 27 (Original). The apparatus of claim 26, wherein the input signal is a NRZ signal.

Claim 28 (Original). The apparatus of claim 26, wherein the input signal is a RZ signal.

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Claim 29 (Original). The apparatus of claim 26, wherein the parametric amplifier is an optical fiber with its zero-dispersion wavelength optimized for parametric amplification, which should be approximately the same as that of the wavelength of the input signal and the saturation amplifier is a semiconductor optical amplifier.

Claim 30 (Original). The apparatus of claim 26, wherein the polarization of the CW laser is aligned with polarization of the input data.

Claim 31 (Original). The apparatus of claim 26, wherein the polarization of the CW laser is linear and aligned to have maximal overlap with polarization of the input data, and the power of the CW laser is controlled so that the power regenerated data is independent of the state of polarization of the input data.

Claim 32 (Original). The apparatus of claim 26, wherein the fiber is a photonic crystal fiber.

Claim 33 (Original). The apparatus of claim 26, wherein the parametric amplification medium is a third nonlinear optical crystals.

Claim 34 (Original). The apparatus of claim 26 wherein the parametric amplification medium is a second-order nonlinear optical crystals used cascading third-order nonlinear optical material.

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Claim 35 (Currently amended). An apparatus for optical regeneration comprising:
a pulsed laser source, wherein the polarization of the pulsed light source is linear;
a parametric amplifier; and
a saturation amplifier wherein input data is used as the pump for the parametric amplifier and output of the parametric amplifier is input into the saturation amplifier.

Claim 36 (Original). The apparatus of claim 35, wherein the pulsed laser source is generated from:

a clock signal recovered from the input data.

Claim 37 (Original). The apparatus of claim 35, wherein the input signal is a NRZ signal.

Claim 38 (Original). The apparatus of claim 35 wherein the input signal is a RZ signal.

Claim 39 (Original). The apparatus of claim 35 wherein the parametric amplifier is an optical fiber with its zero-dispersion wavelength optimized for parametric amplification, which should be approximately the same as that of the wavelength of the input signal and the saturation amplifier is a semiconductor optical amplifier.

Claim 40 (Original). The apparatus of claim 39 wherein the fiber is a photonic crystal fiber.

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Claim 41 (Original). The apparatus of claim 40 wherein the parametric amplification medium is a third nonlinear optical crystals.

Claim 42 (Original). The apparatus of claim 40 wherein the parametric amplification medium is a second-order nonlinear optical crystals used cascading third-order nonlinear optical material.

Claim 43 (Original). The apparatus of claim 35, wherein the polarization of the pulsed laser source is aligned with polarization of the input data.

Claim 44 (Original). The apparatus of claim 35 wherein the polarization of the pulsed laser source is linear and aligned to have maximal overlap with polarization of the input data, and the power of the pulsed laser source is controlled so that the power regenerated data is independent of the state of polarization of the input data.

Claim 45 (Currently amended) An apparatus for optical regeneration comprising:
a pulsed laser source; and
a saturating parametric amplifier, wherein input data is used as a pump for the saturating parametric amplifier and the polarization of the pulsed laser source is linear and aligned to have maximal overlap with polarization of the input data, and the power of the pulsed laser source is controlled so that the power regenerated data is independent of the state of polarization of the input data.

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Claim 46 (Original). The apparatus of claim 45, wherein the input signal is a NRZ signal.

Claim 47 (Original). The apparatus of claim 45 wherein the input signal is a RZ signal.

Claim 48 (Original). The apparatus of claim 45 wherein the parametric amplifier is an optical fiber with its zero-dispersion wavelength optimized for parametric amplification, which should be approximately the same as that of the wavelength of the input signal and the saturation amplifier is a semiconductor optical amplifier.

Claim 49 (Original). The apparatus of claim 45 wherein the polarization of the pulsed laser source is aligned with polarization of the input data.

Claim 50 (Canceled).